INTERNAL PARASITES OF THE PIGMY SPERM WHALE

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Text-fig. 1–16.

THE material on which this report is based was obtained from three pigmy sperm whales, *Kogia breviceps* (Blainville). From one specimen, stranded at Sandgate, Moreton Bay, Queensland, 2nd June, 1933, nematodes belonging to *Anisakis* and *Porrocaecum*, and fragments of a large species of *Crassicauda*, were obtained by Mr. H. A. Longman, Director of the Queensland Museum, Brisbane, and forwarded to us for identification. The other two whales were a female and its calf, which were stranded at Port Victoria, Spencer Gulf, South Australia, in April, 1937, both specimens being obtained by Mr. H. M. Hale, Director of the South Australian Museum. From the adult we collected the same three species of Nematoda (*Anisakis kogiae* n. sp., *Porrocaecum kogiae* n. sp., and *Crassicauda magna* n. sp.), as well as encysted larvae of a cestode, *Phyllobothrium delphini*. The calf contained *Anisakis kogiae*. The stomach of each of the South Australian whales contained beaks of cephalopods, *Sepioteuthis australis* (identified by Mr. B. C. Cotton).

The only helminth previously recorded from this rare whale is a Phyllobothriid cestode larva, *Monorygma grimaldii* (Moniez), whose occurrence was reported by Baylis (1926, 666; 1932, 410). From the large sperm whale, *Physeter catodon*, two species of nematodes (*Anisakis* spp.), two of Acanthocephala (*Bolbosoma* spp.), and a cestode larva (*Phyllobothrium physeteris*) have been recorded.

The types of the species described as new in this paper are deposited in the South Australian Museum, Adelaide; paratype material has been placed in that institution, as well as in the Queensland Museum, Brisbane. Acknowledgment is made of the kindness of the Directors of those Museums, Messrs. Hale and Longman respectively, in giving us the opportunity to study the collections; and of assistance obtained through the Commonwealth Research grant to the University of Adelaide.

ANISAKIS KOGIAE n. sp. (fig. 1–6).

From the stomach of *Kogia breviceps*, Port Victoria, Spencer's Gulf, South Australia; and Moreton Bay, Queensland.

Male 5–5·5 cm.; female 4–6·5 cm. Interlabia absent. Dentigerous ridges present, bilobed on each lip, with about ten teeth on each lobe. Lips of approxi-

mately similar form and length; dorsal 0·05 mm. long, 0·1 mm. wide at base; laterals 0·13 mm. wide, anterior end with slightly narrower bilobed part not very distinct from basal portion; two double papillae on dorsal lip, a double papilla on each ventro-lateral. Excretory pore possibly between ventro-lateral lips. Cervical papillae at 0·44 mm., and nerve ring at 0·31 mm. from head end. Cuticle annulate, also transversely and finely longitudinally striate.

Male. Spicules unequal, 1·4 and 1·9 mm. long in a male 40 mm. in length, stout, tapering to rounded point. About 74 pairs of preanal papillae, arranged more or less in two longitudinal rows on each side, extending for about 2·4 mm. in front of anus; a pair of adanal; two pairs immediately postanal, succeeded by four pairs of stalked postanals arranged in two groups each of two papillae. Caudal alae about 0·35 mm. in maximum width, reached just in front of level of anus. Tail 0·18 mm. long.

Female. Tail bluntly conical, 0·2 mm. long, sometimes with small papilla-like termination. Vulva a little in front of mid-body; vagina 2·2 mm. long; median uterus 6·75 mm. Eggs in upper parts of uteri 0·32 by 0·25 mm.

Two species of *Anisakis* have been described from the sperm whale, *Physeter catodon*—*A. physeteris* Baylis (1923) and *A. catadontis* Baylis (1929). From the former it differs in size, length of spicules, and in the number and arrangement of the caudal papillae. It is distinguished from the latter in being shorter, and in possessing less prominent lobes on the lips, shorter tail and spicules, while the nerve ring and cervical papillae are more anteriorly situated. From *A. simplex* (Rud.), a species widely distributed amongst Cetacea, it differs in having the dorsal lip slightly larger than the others, a smaller number of postanal papillae, and spicules unequal. From *A. kükenthali* (which may perhaps be synonymous with *A. simplex*), it is distinguished by the possession of shorter length, shorter spicules, fewer and differently arranged preanal and postanal papillae. It is shorter than *A. dussumieri* (Beneden), and has fewer postanal papillae. It differs

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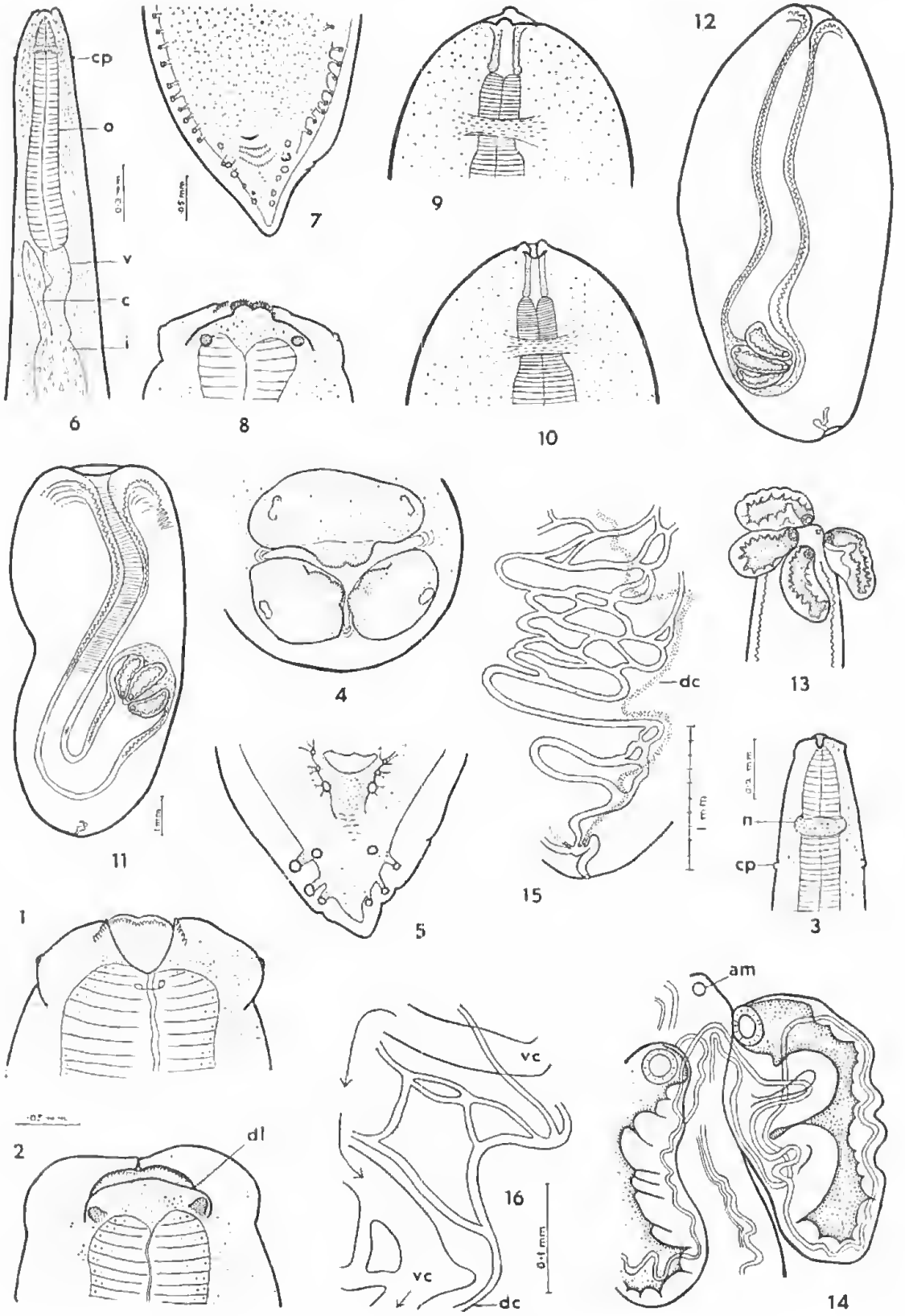
Figs 1–5. *Anisakis kogiae*. 1. head, ventral view; 2. head, dorsal view; 3. anterior end; 4. head, anterior view; 5. tail of male.

Figs. 6–8. *Porrocaecum kogiae*. 6. anterior end; 7. tail of male, ventral; 8. head, dorsal.

Figs. 9–10. *Crassicauda magna*. 9. head, lateral; 10. head, dorsal.

Figs. 11–16. *Phyllobothrium delphini*. 11–12. cysts, slightly flattened; 13. anterior end of scolex removed from cyst and compressed; 14. two bothridia and apex of scolex, showing arrangement of excretory canals; 15. plexus of ducts belonging to the ventral excretory system of one side in the posterior part of the cyst; 16. portion of dorsal plexus of one side in the posterior region of the cyst, arrows indicate direction of ventral canal proceeding towards the excretory bladder.

Figs. 1, 2, 4 and 8 are drawn to scale below fig. 1; 5 and 7 to scale beside fig. 7; 3, 9 and 10 to scale beside fig. 3; 11, 12 and 13 to scale beside fig. 11; 14 and 15 to scale beside fig. 15. a m, apical muscle; c, caecum; c p, cervical papilla; d c, dorsal excretory canal; d l, dorsal lip; i, intestine; n, nerve ring; o, oesophagus; v, ventriculus; v c, ventral excretory canal.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from *A. typica* (Dies.) in the form of the lips, relatively shorter ventriculus, shorter oesophagus, less difference in the size of the two spicules, and number and arrangement of the postanal and preanal papillae.

PORROCAECUM KOGIAE n. sp. (fig. 7–8).

From the stomach of *Kogia breviceps*, Spencer's Gulf, South Australia; and Moreton Bay, Queensland.

Male 2–3 cm.; female 1·5–3 cm. Cuticle with annulations but without finer transverse striations. Lips of similar shape; dorsal about 0·04 mm. long, 0·09 mm. wide at base; ventro-laterals about as long, but narrower; internally-projecting bilobed part of each lip narrow (about 35μ wide, 10μ long in dorsal lip), with rather long teeth in dentigerous ridge; one papilla on each ventro-lateral lip, two on dorsal.

In a female 1·5 cm. in length, oesophagus 2 mm. long, 1 : 7·5 of body length, anterior portion 1·75 mm., ventriculus 0·35 mm. long, and usually more or less straight; intestinal caecum slightly longer than ventriculus. Nerve ring 0·3 mm. from the head end; cervical papillae just behind nerve ring. Excretory pore apparently at same level as nerve ring.

Male. Spicules unequal; 0·17 and 0·2 mm. long in a worm 14·7 mm. long, longer spicule 1 : 7·3 of body length; tapering. About 65–70 pairs of preanal papillae, arranged more or less in two longitudinal lines laterally, the more anterior being scattered, the series extending to 0·9 mm. from posterior end of worm. Six pairs of postanal papillae arranged in two groups of three; the more anterior group containing larger papillae, the middle one being double. Three transverse rows of denticles just posterior to anus. Gubernaculum present.

Female. Tail conical, pointed, 1 : 50 of body length. Vulva a short distance behind oesophagus.

P. kogiae appears to be the first member of the genus to be described from cetaceans. It shows resemblance to *P. decipiens*, a widely distributed parasite of seals, but differs in being generally shorter, in the position of the vulva, in the presence of three rows of post-anal denticles, and in the possession of unequal spicules and a greater number of preanal papillae.

Larvae of *Porrocaecum* were present amongst the material, these showing the same relative length of the oesophagus as in the adults. The three lips were not differentiated, but a larval tooth was present.

CRASSICAUDA MAGNA n. sp. (fig. 9–10).

From *Kogia breviceps*, Port Victoria, South Australia; and Moreton Bay, Queensland.

The South Australian worm, a female, was dissected from the neck region, where it occurred entwined in the connective tissue, lying in a very narrow tunnel. Its presence was revealed during flensing, the parasite having been cut across in several places. On account of the tangled manner in which it lay, it was difficult to extract it. The total length of the fragments obtained measured, when in a preserved state, about twelve feet (3·7 metres), the longest unbroken piece being over nine feet. The posterior region was not seen, and fragments were still traceable in the blubber when collecting ceased. The species appears to be the longest nematode yet described. The Queensland material is also fragmentary, and has the same appearance and diameter, and can safely be assigned to the same species.

Maximum diameter of preserved material 3–4 mm. Head rounded, with two small lips in lateral positions; the two lateral and four submedian papillae described by Baylis as characteristic of *Crassicauda* were not observed. Buccal cavity strongly chitinized; 0·14 mm. long; width from side to side 0·06 mm., from dorsal to ventral walls 0·08 mm. Head, measured across base of buccal cavity, 0·48–0·53 mm. Oesophagus total length 1·8 mm., first 0·3 mm. narrower than the remainder. Nerve ring 0·35 mm. from head end. Intestine 0·55 mm. wide anteriorly. Eggs extremely abundant, 40–42μ by 23–28μ, thick-shelled.

Our species exceeds *C. crassicauda* and *C. giliakiana* in diameter and in the recorded length of fragments. Its buccal cavity is relatively smaller than in any species in which it has been described. The eggs are much smaller than those recorded for other species. *C. bennetti* appears to be a larger worm than *C. magna*, its body diameter ranging to 8 mm., but the fragments described were shorter. *C. boopis* is about as wide as *C. magna*. *C. bennetti* and *C. boopis* are known only from posterior ends, while we have seen only an anterior end from each collection. The egg shells of *C. magna* do not show the thickened midregion which seems to be characteristic of those of *C. bennetti*. Our species appears to be nearest to *C. boopis* from the hump-back whale, *Megaptera boops* (= *M. nodosa*).

Crassicauda is restricted to cetaceans, *C. magna* being the sixth species to be described. It is to Baylis (1916; 1920; 1922) that we owe much of our knowledge of them.

The type *C. crassicauda* (Creplin, 1829) originally described as a *Filaria*, came from the urethra of a northern rorqual identified as *Balaena rostrata*, but which Baylis (1916, 145) showed to be probably *Balaenoptera physalus* L. Leiper and Atkinson (1914; 1915) erected *Crassicauda* to receive a parasite regarded by them as belonging to Creplin's species, but obtained from a humpback whale, *Megaptera nodosa* Bonn., from northern New Zealand waters. Hamilton (1916, 132) recorded the presence of *C. crassicauda* or a closely-related species in the urinary ducts of three species of rorquals, *Balaenoptera physalus* L., *B. musculus*

L., and *B. borealis* Less., especially the first-named, in Scottish waters. Baylis (1916) gave a description of the head region of a long fragment taken from the kidney of Cuvier's whale, *Ziphius cavirostris*, the worm being regarded as *C. crassicauda*. In a later communication (1934, 404 and 413) the specimen was assigned doubtfully to *C. boopis*, a species which Baylis (1920, 411) erected to receive Leiper and Atkinson's species, the latter being shown to be distinct from Creplin's. The true *C. crassicauda* was re-described, and both species were figured, material of the former having been collected from the blue whale, at Deception Island, South Shetlands. The presence of the genus, represented possibly by a third species, was recorded by Baylis (1920, 418) from the kidney of *Hyperoodon* sp. from the South Orkneys. Additional information regarding *C. crassicauda* from whales from South Georgia was published in 1922 by Baylis. Baylis's material from *Hyperoodon* was described by Spaul (1926) as *C. bennetti*. We consider it likely that Baylis's species from *Ziphius* was *C. bennetti* rather than *C. boopis*. Yorke and Maplestone (1926) republished Baylis's figures of *C. crassicauda*. Hoeppli and Hsü (1929, 33) described *Onchocerca fuelleborni* from nodules in the vagina of *Neomeris phocaenoides* in China, but Baylis (1934, 405) transferred it to *Crassicauda*. Joyeux and Baer (1931) recorded *C. crassicauda* from the mammary gland of *Tursiops tursio* Fabr. from the Mediterranean, but Skrjabin and Andreewa (1934, 28) consider that the parasite probably did not belong to that species, and preferred to designate it as *Crassicauda* sp. In 1932 Baylis, in his list of worms parasitic in Cetacea, mentioned (p. 410) that the original host of *C. bennetti* was probably *Hyperoodon planifrons*. Skrjabin and Andreewa (1934) described *C. giliakiana* from the beluga, *Delphinaptera leucas*, from the Sea of Okhotsk; published a summary and figures of *C. crassicauda*, *C. boopis*, and *C. bennetti*; and gave a key to these four species. Baylis (1920, 1922) had already expressed doubts regarding the correctness of assigning the genus to the Filariidae. Yorke and Maplestone (1926, 437) erected Crassicaudinae (Filariidae), but Skrjabin and Andreewa (1934) considered that the genus belonged to the Spirurata, and placed it in a separate family, Crassicaudidae (1934, 26–28).

PHYLLOBOTHRIUM DELPHINI (Bosc) Beneden (fig. 11–16).

A number of cysts, ovate to cylindrical and measuring (when uncompressed) 7·5 to 13·5 mm. long by 5 to 6 mm. wide, were found in the blubber of the tail region. A spherical form, 7·5 mm. in diameter, was also obtained. The smallest cyst seen was only 4 by 3 mm. They all possessed an invaginated scolex and neck, together measuring 10 mm. long in a slightly flattened cyst 18 mm. in length; and 22 mm. in one 15·5 mm. long, in which the head and anterior part of the neck

were bent to become directed toward the region of invagination. The scolex was only slightly wider than the neck, the edges of the bothridia being considerably folded. The tissues of the cyst, except the invaginated portion and the outer body wall, were composed of a very loose parenchyma. The width of the invaginated neck region, including the denser tissue surrounding the cavity, was about one-fifth to one seventh that of the lightly compressed cyst.

The bothridia varied in dimensions according to the state of contraction and folding. They were usually about 1·15 mm. long by 0·5 mm. broad, with the margin thrown into rather deep folds, except anteriorly. Each was provided in front with a well-developed sucker 0·16 to 0·2 mm. in diameter when uncompressed. The front end of the scolex projected as a low dome with a very weak apical muscle plug seen only in favourable preparations, and measuring 0·07 mm. in diameter. The neck showed definite transverse musculature, closely arranged and beginning at about one-quarter its length from the head, and becoming more marked as it approached the bladder.

The excretory system was characteristic. The terminal bladder was usually somewhat twisted. The ventral and dorsal canals of each side subdivided and underwent anastomoses, so that four somewhat ladder-like plexuses were formed, the narrower dorsal vessels more or less accompanying the wider ventral canals. The latter anastomosed to a greater extent than the dorsals. The arrangement of part of the system of one side in the vicinity of the bladder is shown in figs 15 and 16. The plexuses extended forwards in the tissues of the cyst almost to the anterior end, where only the four chief canals passed over into the wall of the invaginated region, the two canals of each side then becoming very closely approximated and thrown into very close zigzags. These canals formed a series of loops in the scolex, the wider canals penetrating the bothridia, the arrangement being shown in fig. 14.

The form of the bothridia indicates that the larva belongs to *Phyllobothrium* and not to *Monorygma*. In order to determine its relationships more closely a survey of the recorded occurrences of similar cysts in cetaceans is necessary.

Bose (in Buffon, Hist. Nat., 3, 1802) reported finding a larval cestode, named by him *Hydatis delphinii*, in fatty tissue of *Delphinus delphis*. Laennec, in 1804, regarded the hydatid of the dolphin as *Cysticercus delphini*. Rudolphi (1810, 265) mentioned Redi's earlier record of cysts in the viscera and intestine of *D. delphis*, and placed them as *Vermis delphini-delphis* amongst doubtful genera. In 1819 Rudolphi referred to the same record (1819, 186 and 799), using the term *delphini* under *Dubium*, but Bose's form was placed by him (1810, 236; 1819, 182) amongst the doubtful species as *Cysticercus delphini*, though he gave a short account of it

(1819, 551) based on badly preserved material collected by Chamisso, no locality or host being mentioned.

In 1837 Bennett referred to the occurrence of numerous cysts of a species of cysticercus in the blubber of the sperm whale (cachalot). In 1850 Diesing (1850, 617), used the term *Cephalocotyleum Delphini delphidis* Rud. for the parasite referred to by Redi and by Rudolphi (1819, 186); but placed (1850, 493) *Hydatis delphini* Bose and *Cysticercus delphini* Rud. (1810, 236; 1819, 182 and 551) under the latter name as *species inquirendae*. He also referred (1850, 493) to Bennett's cysts as *Cysticercus Balaenae mysticeti* Bennett, apparently having read incorrectly Bennett's statement regarding the host. Diesing, in a later work (1864), gave a brief summary regarding *C. delphini* from *Delphinus delphis* (p. 63); he also recognized his error regarding the host for Bennett's cyst, and called it (p. 67) *C. physeteris* Bennett.

Cobbold (1879, 421–2) referred to some of the foregoing records as well as to some relating to the presence of monostomes in the body wall of cetaceans, remarking on the possibility of such trematodes being confused with cysticerci. The occurrence of *Phyllobothrium* larvae in *Physeter tursio* (apparently *Tursiops tursio*, i.e. *T. truncatus*) was also noted. He also mentioned that Van Beneden (1870) considered *C. delphini* to be an immature stage of *Phyllobothrium delphini* found abundantly in a specimen of *D. delphis* in 1868. This latter material had been described by Gervais (1870, 779) as *Stenotaenia delphini*, this author referring in 1885 to *Phyllobothrium delphini* from *Delphinus tursio*. Beneden, in 1888, recorded finding an agamous *Phyllobothrium* in the subcutaneous tissues of *Ziphius cavirostris*. Moniez (1889) described as a new species *Taenia grimaldii*, in its cysticercus stage, which occurred in a dolphin, the parasite possessing a very long neck, but the account was incomplete. Leidy (1891, 418) gave a very brief account of *Phyllobothrium inchoatum* from the blubber of *Mesoplodon sowerbiensis* (i.e. *M. bidens*). Stossich, in 1898, reported *Scolex delphini* from the rectum of *Grampus griseus* in the Adriatic.

Linton (1905) gave a description of some cysts from *Lagenorhynchus acutus* from New England waters (U.S.A.). There were two kinds present, the smaller belonging to *Phyllobothrium*, while the larger were described as *Taenia chamissonii*. He stated that Rudolphi's *Cysticercus delphini* (1810) appeared to belong to *Phyllobothrium*, while his *C. delphini* (1819, 236) was almost certainly identical with *T. chamissonii*. Linton regarded the latter as being an immature stage of a species of *Taenia* or closely-related genus, whose adult condition was more likely to be reached in a mammal such as the killer whale, *Orcinus orca*. A feature of his species was the presence of a relatively very long invaginated region. He was evidently unaware of Moniez's observations.

Baylis (1919) gave a detailed account of Moniez's cysticercus, assigning it to *Monorygma*, its nearest known species being *M. elegans* Monticelli, 1890, as described by Zschokke (1889) under *M. perfectum* Dies. He also stated that *Stenotaenia delphini* Gervais appeared to be identical with, or closely related to, the cysticercus. Baylis's material was obtained from *Lagenorhynchus acutus* from English waters.

In 1924 Meggitt assigned to *Monorygma Taenia grimaldii* Moniez, *T. chamissoni* Linton, and *Stenotaenia delphini* Gervais, while *Cysticercus physeteris* Dies. was placed under *Phyllobothrium*. Southwell (1925, 152), in his monograph of the Tetraphyllidea, republished Leidy's account of *Phyllobothrium inchoatum*, and stated that the latter could not be differentiated from *P. lactuca*. He treated *Monorygma* Diesing (1863) as a synonym of *Phyllobothrium* Beneden 1849, and stated that *Cysticercus Taeniae grimaldii* probably belonged to *Phyllobothrium* (p. 165). He placed *P. delphini* Gervais (i.e. *Taenia chamissonii* Linton) amongst the doubtful species (p. 182).

Baylis (1926) recorded the occurrence of *C. Taeniae grimaldii* in a pigmy sperm whale, *Kogia* sp. ? *breviceps*, from southern India, and reported that *C. delphini* Rud. (1819, nec. 1810), as well as the cysts described by Moniez, Gervais, and Linton, were all closely related, and possibly identical, forms. In 1932 Baylis published his valuable list of worms recorded as parasitic in Cetacea.

We may now review the facts noted above. It is obvious that there are two distinct types of Phyllobothriid cysts to be found in cetaceans, both of them originally described with the specific name *delphini*—*C. delphini* (Bosc, 1802), Rud, 1810 (perhaps Laennec, 1804), and *C. delphini* Rud., 1819. The former belongs to *Phyllobothrium*, and includes also *Phyllobothrium* sp. of Linton (1905, 819) and *P. delphini* Beneden (1870). *C. delphini* Rud., 1819, is apparently the same as *Taenia grimaldii* and *T. chamissoni*, and has been adequately described by Baylis. This latter group represents the larval stage of a species of *Monorygma*, and it seems that Moniez's name is the earliest available, i.e. *M. grimaldii* (Moniez) Meggitt, since Rudolphi's (1819) and Gervais' names are invalidated by Bosc (1802) and Rudolphi (1810). *Stenotaenia* Gervais is a synonym of *Monorygma*. To which of these two groups the other cysts, to which some form of scientific name has been given, should be assigned, cannot be determined as yet. Most of them are nomina nuda. Baylis listed *P. physeteris* (Dies.) as possibly identical with *P. delphini* Bosc.

Southwell's statement (1925) that *P. inchoatum* Leidy is a synonym of *P. lactuca*, is not supported by our observations. Leidy's very brief account can be applied to our cysts, and the form of the scolex and of the bothridia in our specimens is not that of *P. lactuca*, but resembles more closely that of *P. unilaterale*

Southwell (1925, 155), syn. *P. thridax* Zschokke (1888, nec Beneden, 1850), but the bothridia are much more elongate and narrowed than in the European species. *P. inchoatum* can be regarded provisionally as a synonym of *P. delphini* (Bose). We attribute our cysts to the latter species.

Kogia breviceps is now known to harbour two kinds of Phyllobothriid cysts—those belonging to *P. delphini* and to *Monorygma grimaldii*. The adult stage of each must occur in an elasmobranch, probably one of the larger sharks such as the widely distributed white pointer (*Carcharodon carcharias* L.) and tiger shark (*Galeocerdo arcticus* Fab.), or perhaps the Greenland shark, *Scymnus* or *Somniosus glacialis* and its southern representative, which is not as yet identified definitely.(1)

Linton (1922) described *Phyllobothrium tumidum* from *Carcharodon carcharias* and *Isurus dekayi* from Massachusetts waters. The form of the scolex and of the bothridia is essentially the same as that figured by us (compare Linton's fig. 15 and our fig. 14). He believed that cestode larvae found in squid and described by Leidy in 1887 as *Taenia loliginis*, and transferred in 1890 to *Tetrabothrium* or to *Phyllobothrium*, represented early stages of the parasite. He recorded finding this type of larva in cephalopods and various fish, and noted its very close resemblance to Beneden's figure of the scolex of *P. delphini* Ben., 1870, from the blubber of a porpoise. We regard *P. tumidum* Linton as the adult stage of *P. delphini* (Bose) Beneden, the latter name having priority; and consider that *P. inchoatum* Leidy is also a synonym.

It may be pointed out that seals in the Antarctic and Subantarctic may contain large *Phyllobothrium* cysts (distinct from, but closely related to, *P. delphini*) in the blubber (Johnston, 1937, 21–24), while a species of *Monorygma*, *M. macquariae* Johnston (1937, 24–32), has been described from a southern *Somniosus* sp., the cestode later being considered (1937, 59) as identical with *M. magnum* (Hart, 1936) from the Greenland shark. Large sharks like the white and tiger sharks are known to prey on seals in the vicinity of Port Lincoln, South Australia, and could probably devour dolphins and small whales.

Blainville, in 1825, published a short account of a smooth cyst found at Havre, France, encysted in the blubber of *Delphinus dalei*, which Cobbold (1879, 421) stated was a synonym of *Micropteron sowerbiensis*, i.e. *Mesoplodon bidens*. The parasite was named *Monostomum delphini* by Diesing (1850, 390) and *M. blainvillei* by Cobbold in 1860. The latter (1879) referred to the possibility of the species occurring in *Hyperoodon* and *Lagenorhynchus*, and to the possibility of monostomes and cysticerci being confused. Brandes, in 1892, placed Diesing's

(1) Waite, E. R. Fishes. Austr. Antarct. Exp. Rep., Ser. C.1, 1916, 51.

species under *Monostomulum*. Price (1932, 57) republished Blainville's account, stated that the organism was not likely to be a larval monostome, and suggested that the worm was the metacercaria stage of *Alaria* or a related trematode genus, and accordingly transferred it to *Agamodistomum*. It seems to us that the species may have been a Phyllobothriid cysticercus, perhaps *P. delphini* (Bosc).

REFERENCES.

Baylis, H. A. (1916) : On Crassicauda crassicauda (Crepl.) and its hosts. *A.M. N.H.* (8), 17, 144–48.

Baylis, H. A. (1919) : A remarkable cysticercus from a rare dolphin. *A.M.N.H.* (9), 3, 417–24.

Baylis, H. A. (1920) : On the Classification of the Ascaridae I, etc. *Parasitol.*, 12, 253–64.

Baylis, H. A. (1920) : Observations on the Genus Crassicauda. *A.M.N.H.* (9), 5, 410–19.

Baylis, H. A. (1922) : Note on the Habitat and Structure of Crassicauda. *Parasitol.*, 14, 9–12.

Baylis, H. A. (1926) : Note on the Occurrence of "Cysticercus Taeniae grimaldii" in a New Host. *A.M.N.H.* (9), 18, 665–67.

Baylis, H. A. (1932) : A List of the Worms Parasitic in Cetacea. *Discovery Reports*, 6, 393–418.

Bennett, F. D. (1837) : On the Natural History of the Spermaceti Whale. P.Z.S., 1837, 39–42.

Cobbold, T. S. (1879) : Parasites : A Treatise of the Entozoa of Man and Animals.

Creplin, F. C. (1829) : Filariae et Monostomi speciam novam in Balaena rostrata repertam. *Verh. d. k. Leop. Carol. Ak. Naturf. (Bonn.)*, 14 (2), 871–82.

Diesing, K. M. (1850–1) : Systema helminthum.

Diesing, K. M. (1864) : Revision der Cephalocotyleen. Abt. Paramecocotyleen. *Sb. k. Ak. Wiss. Wien*, 48, 200–345.

Diesing, K. M. (1864) : Revision der Cephalocotyleen. Abt. Cyclocotyleen. *Sb. k. Ak. Wiss. Wien*, 49, 357–430.

Gervais, H. (1870) : Sur les entozoaires des dauphins. *C.R. Acad. Sci. Paris*, 71, 779.

Hamilton, J. E. (1916) : [*Report on Belmullet Whating Station.*] Brit. Assoc. Rep. (1915), 124–46.

Hoeppli, R. and Hsü, H. F. (1929) : Helminthologische Beiträge aus Fukien und Chekiang. *Arch f. Schiffs. u. Tropen-Hyg.*, 33, *Beiheft* 1, 43 pp.

Johnston, T. H. (1937) : The Cestoda of the Australasian Antarctic Expedition. *Austr. Antarct. Exp. Sci. Rep.*, Ser. C, 10 (4), 74 pp.

Joyeux, C. and Baer, J. G. (1931) : Sur la présence du nématode Crassicauda crassicauda (Creplin, 1829) chez un dauphin des côtes de la France. *Bull. Soc. Path. exot.*, 24, 198–203.

Leidy, J. (1891) : Notices of entozoa. *Pr. Acad. Nat. Sci. Philad.* (3), 20, 410–18.

Leiper, R. T. and Atkinson, E. L. (1914) : Helminthes of the British Antarctic Expedition, 1910–1913. P.Z.S., 1914, 222–26.

Leiper, R. T. and Atkinson, E. L. (1915) : Parasitic Worms. *Brit. Antarct. (Terra Nova) Exp. Nat. Hist. Rep. Zool.*, 2 (3), 19–60.

Linton, E. (1905) : Notes on Cestode Cysts, Taenia chamissonii, New Species from a Porpoise. *Pr. U.S. Nat. Mus.*, 28, 819–822.

Linton, E. (1922) : A New Cestode from the Man-eater and Mackerel Sharks. *Pr. U.S. Nat. Mus.*, 61 (12), 1–16.

Meggitt, F. J. (1924) : The Cestodes of Mammals. London.

Moniez, R. (1889) : Sur la larve du Taenia grimaldii, nov. sp., parasite du dauphin. *C. R. Acad. Sci., Paris*, 109, 825.

Price, E. W. (1932) : The Trematode Parasites of Marine Mammals. *Pr. U.S. Nat. Mus.*, 81 (13), 68 pp.

Rudolphi, C. A. (1810) : Entozoorum sive vermium intestinalium historia naturalis. Amsterdam.

Rudolphi, C. A. (1819) : Entozoorum Synopsis. Berlin.

Skrjabin, K. I. and Andreewa, N. K. (1934) : Un nouveaux nématode, Crassicauda giliakiana n. sp., trouvé dans reins de Delphinoptera leucos. *Ann. Parasitol.*, 12, 15–28.

Southwell, T. (1925) : A monograph of the Tetraphyllidea, with Notes on the Related Cestodes. *Mem. Liverpool Sch. Trop. Med.*, 2, 368 pp.

Spaul, E. A. (1926) : Crassicauda bennetti, sp. n., a New Nematode Parasite from the Bottle-nosed Whale (Hyperoodon). *A.M.N.H.* (9), 17, 581–85.

Stiles, C. W. and Hassall, A. (1899) : Internal Parasites of the Fur Seal. Rep. Fur Seal Investigations. *Washington, D.C.*, 3, 99–177.

Yorke, W. and Maplestone, P. A. (1926) : The Nematode Parasites of Vertebrates.